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A REVISION OF THE WEST AMERICAN FLYING SQUIRRELS.

BY SAMUEL N. RHOADS.

The recent acquisition of four fine specimens of an apparently undescribed Flying Squirrel from the San Bernardino Mountains, California, having made it necessary to go pretty fully into the relationships and nomenclature of the described forms inhabiting the Rocky Mountain and Coast Ranges of America, the author has secured the loan of most of the available specimens of these in our eastern museums and made them the basis of the following study. Before passing to their consideration I would gratefully acknowledge the loan, through Mr. F. W. True, of the study series of western *Sciuropterus* from the Smithsonian Institution, also the permission to examine specimens in the American Museum of Natural History, and the loan of a valuable series of skins and skulls from British Columbia from the collections of Messrs. E. A. and O. Bangs, through the courtesy of my friend, Mr. Outram Bangs.

Besides these and a series of about forty specimens in my private collection, I should specially refer to those in the collection of the Academy of Natural Sciences of Philadelphia, including as they do the type of *Sciuropterus oregonensis* (Bachman) and the supposed type of *Sciuropterus alpinus* of Audubon and Bachman, collected by J. K. Townsend.

Previous to Dr. J. A. Allen's Monograph of the *Sciuridæ* there were, variously recognized, four species or varieties of American Flying Squirrel: a, the small southern *Sciuropterus volans* (Linnaeus) (= *S. volucella* of authors) forming the type of its genus; b, the large *S. sabrinus* (Shaw) (= *S. hudsonius* (Gmel.)) of the Hudson Bay Regions; c, the large *S. alpinus* (Richardson) of the eastern slope of the Rocky Mountains; and d, the smaller *S. oregonensis* (Bachman) of the Pacific Coast lowlands near the mouth of the Columbia River.

In 1877 Dr. Allen¹ united these under one species "*Sciuropterus volucella*," making the smaller southeastern animal the type and recognizing "*S. hudsonius*" as a northern transcontinental subspe-

¹ Monog. N. Amer. Rod., 1877, p. 655.

cies or "variety" of *volucella*, with *alpinus* and *oregonensis* as its synonyms. Until 1896, Dr. Allen's ruling, at least in reference to the inseparability of the northern and southern forms of our eastern Flying Squirrels as distinct species, was generally accepted.

In that year Mr. Outram Bangs, having made a study of a much better series of specimens than was accessible to Dr. Allen, showed² that the habitats of *sabrinus* and *volans* overlapped, the two forms not intergrading over this common territory. So far as my study of the western forms has made it necessary to consult the eastern species, the verdict of Mr. Bangs appears fully sustained, and the cranial and external characters of the *Sciuropteri* inhabiting our country from the Rocky Mountains westward to the Pacific seem to equally justify their specific separation from any of our eastern species.

The first name specifically given by a naturalist to a western Flying Squirrel was imposed by Richardson in the London Zoological Journal of 1828, pages 519, 520. In this place he describes a squirrel taken on the second Franklin Expedition of 1825-'26 as follows:—

"12. *Pteromys alpinus* [here follows Latin description of characters], Rocky Mountain Flying Squirrel; yellowish-brown above; tail flat, longer than the body, blackish-gray, flying membrane with a straight border. Size greater than that of the Siberian Flying Squirrel. Hab[itat].—The valleys of the Rocky Mountains."

In 1829³ he more fully described the animal, comparing it with *Sciuropterus sabrinus* and reducing it to a variety of that species. From this article we are enabled to fix definitely the type locality of *alpinus* to be the headwaters of the "Elk" [=Athabasca] and "South Branch of the Mackenzie" [=Peace] Rivers, on the eastern drainage of the main range of the Rocky Mountains in northwestern Alberta and east central British Columbia. From Richardson's account of the itinerary and labors of Drummond, who collected the type specimens, the one first mentioned was probably taken by Drummond when he returned after his fifty mile exploration of the Columbia Portage Road "to the head of Elk River, on which he passed the winter [1825-'26] making collections."⁴

It has been found impossible to secure any good specimens of

² Proc. Biol. Soc. Wash., 1896, pp. 162-167.

³ Faun. Bor. Amer., 1829, pp. 195, 196.

⁴ Ibid, Introd., pp. xvi, xvii.

Sciuropterus from nearer the type locality of *alpinus* than Stuart Lake, B. C., lying just west of the Pacific-Arctic watershed separating the affluents of the Peace River and the Frazer River, about 150 miles west of the type locality of the "Elk River" specimen and 100 miles west of the head of the Smoky River branch of the Peace River,⁵ all about at the same latitude of 54°. An excellently preserved skin of an adult male *Sciuropterus* from Stuart Lake with separated skull belonging thereto, and careful flesh measurements and data made by Mr. W. E. Traill, sent by him to the Provincial Museum of Victoria, B. C., and donated to the writer by Mr. John Fannin, is considered in this study as typical of the essential specific characters of Richardson's *alpinus*. From its faunal position, however, in a region less elevated and more humid than that which forms the type locality of *alpinus*, it is, as would be expected, darker colored. Richardson's description in the *Fauna Boreali Americana*, as well as Audubon and Bachman's plate of *alpinus*, indicate an animal lighter colored (yellowish-brown above) than the reddish-brown *sabrinus*, conditions which our knowledge of other mammals from the more arid eastern slopes of the Rocky Mountains would lead us to expect. The Stuart Lake specimen, though too dark to answer for a type of the color characters of *alpinus* is, nevertheless, in size and proportions as contrasted with *sabrinus*, specifically the same as *alpinus*, and will be so considered in the absence of specimens from nearer the type locality of that species.

Confirming these premises, but in themselves so lacking the requirements of modern research as to be of little value, are two specimens of probably typical *alpinus* from Fort Liard, in the northeastern corner of British Columbia. These are labelled under numbers 5,655, 5,656 of the catalogue of the Smithsonian Institution, and were collected by W. L. Hardisty and Bernard R. Ross. One of them is a badly mounted specimen and the other a flat skin lacking all but the basal portion of tail. Their skulls are missing, the upper incisors of No. 5,656 alone being present. The pelage of both is short and rather harsh, evidently that of summer. The mounted specimen has undoubtedly been faded by exposure to light. It is a duller, more slaty wood-brown than Canadian *sabrinus* above and differs from the Stuart Lake specimen in having scarcely any trace

⁵ Prof. J. Macconn, of the Geological Survey of Canada, in a recent letter states that Drummond did not collect in British Columbia, and that his Peace River rambles were confined to Smoky River.

of sooty on tail, feet and head, and in the whiteness of the hair of underparts. The skin specimen, on the other hand, is between russet and wood-brown above, the underside being washed with dirty cream-buff and light Isabella color. The latter specimen has the appearance of being once immersed in alcohol. The great length of the hind foot (42 mm., when dry) and the general lightness of underparts are the only reliable characters in these specimens which go to justify the specific separation of *sabrinus* and *alpinus*, and their distinction from *fuliginosus*.

In the third volume of their *Quadrupeds of North America*, Audubon and Bachman undertook to redefine the *alpinus* of Richardson and appropriate the name to themselves.⁶ They describe and figure it from a specimen which we may infer from their account was taken by Townsend when crossing the Rocky Mountains in southeastern Idaho.⁷ Professor Baird, in commenting on this specimen, remarks⁸: "There is a Flying Squirrel in the museum of the Philadelphia Academy of Natural Sciences labelled '*Pteromys alpinus*, Columbia River, Dr. Townsend,' but I am unable to say whether it is really the type of Bachman's description or not. The locality is probably the Rocky Mountains, as described by Bachman, nearly all of Townsend's specimens having been labelled Columbia River, whether collected there or on the overland march from St. Louis." With this specimen in hand I find it difficult to regard it as the type of Audubon and Bachman's description and plate of *alpinus*. In both color and measurements it differs considerably from their diagnosis.

The second western Flying Squirrel to receive a new specific name was the "*Pteromys oregonensis*" of Bachman described in 1839 in the *Journal of the Academy of Natural Sciences of Philadelphia* from a specimen taken by J. K. Townsend in the "pine woods of the Columbia River near the sea." This type specimen yet exists in good condition in the collection of the Academy of Natural Sciences of Philadelphia. It remains as originally mounted in the flight position, with membranes widely extended, the limbs at right angles to the body and the skull within the skin, apparently unbroken. Though somewhat faded by exposure to the light it closely

⁶ Quad. N. Amer., 1854, pp. 206-208.

⁷ They made the mistake of thinking (l. c., p. 207) that Townsend crossed the mountains by the same route as Drummond, and that the specimens of each were topotypes!

⁸ Mam. N. Amer., 1858, p. 289.

matches specimens of the same race from nearby localities on the Pacific Coast of British Columbia and Washington. The original description of Bachman, as well as the plate of Audubon and Bachman, are very fairly diagnostic of *oregonensis* except the part relating to the size and shape of the ears and of the flying membrane, in which latter character of *Sciuropterus* both Bachman and Richardson were misled by the distorted condition of dried specimens in a bad state of preservation and wholly lacking reliable measurements.

To my knowledge no other names than those already treated of have been proposed for the *Sciuropteri* coming within the scope of this paper. In the following synopsis I have recognized *alpinus* as the type of a western group, distinct from the eastern species and separable into four subspecies, *alpinus* of the eastern Rocky Mountain districts, *oregonensis* of the Pacific Coast lowlands, *fuliginosus* of the Cascade Mountains, and *californicus* of the southern Sierra Nevada range.

I have been unable to examine any specimens from large areas undoubtedly tenanted by this genus, the most noticeable Jack being from the United States east of the Cascade Range and the more northerly coasts of Alaska. It is probable that the form recorded from Cook's Inlet, Alaska, by Turner,⁹ will prove separable from *oregonensis*, as also the form represented by a badly preserved specimen from Fort Crook, Shasta County, California, which indicates a smaller race than *californicus* paler than *oregonensis*.¹⁰ There is little doubt also that the southern Rocky Mountains will furnish another race separable from typical *alpinus* and its more western allies.

No sexual color differences in our Flying Squirrels are apparent. If any difference in size, the series of skulls and skins show that the largest specimens are females, and these outnumber the males nearly two to one.

The color differences between winter and summer pelage in the *alpinus* group are not great, after the molt has been fully effected. It consists in the shorter, coarser, duller haired aspect of the summer coat as compared with that of winter and in the shortening of the colored tips and consequent darkening of pelage due to the exposure of the plumbeous bases of hairs.

⁹ Cont. Nat. Hist. Alas., 1886, p. 204.

¹⁰ Cooper, Proc. Cal. Acad. Sci., 1868, p. 4, records a Flying Squirrel from Mendocino Co., Cal., which represents the southern extreme of *oregonensis*.

1. *Sciuropterus alpinus* (Richardson). Rocky Mountain Flying Squirrel.

1828. *Pteromys alpinus* Richardson, Zool. Jour., (Lond.), III, p. 519.

1829. *Pteromys sabrinus* var. *β. alpinus* Richardson, Faun. Bor. Amer., I, p. 195.

1854. *Pteromys alpinus* Audubon & Bachman, Quad. N. Amer., III, p. 206.

1877. *Sciuropterus volucella*, var. *hudsonius* Allen, Monog. N. Amer. Rod., p. 655.

1881. *Sciuropterus volucella*, a *alpinus* Trouessart, Cat. des Mam., p. 67.

Type locality.—Rocky Mountains, at the sources of the Athabasca River ("Committee's Punch Bowl") and the Peace River (Smoky River?), Alberta.

Geographic distribution.—Main range of the Rocky Mountains between latitudes 40° and 60° (Uintah Mountains to Fort Liard¹¹). Northern and southern limits unknown.

Habitat.—Dense pine forests of the mountains.

General characters.—Size, largest of the American Flying Squirrels, with relatively longer tail, larger, narrower skull, flatter brain case, longer rostrum and nasal bones, shorter postorbital processes, and more massive dental armature than *sabrinus*.¹² Colors above and below lighter (grayer below, more tawny above), lacking the tawny of underparts and rusty or cinnamon shades of upper parts of *sabrinus*.

Color.¹³—(Probably based on Drummond's winter specimens "from the head of Elk River"). "The end of the nose is hair-brown and the fur about the mouth and on the sides of the nose has a dark, smoke-gray color. * * * * The surface of the fur on the back has a yellowish-brown color, without any tendency to the more red hue of the back of *Pt. sabrinus*. The fur of the throat and belly is a grayish-white, without any tinge of buff color; the tail has a flat, oblong, oval form, and has a blackish-brown color above, and is merely paler beneath"

Dimensions.—Of Richardson's type (probably from dry skin); total length 336 millimeters; tail vertebræ 133; hind foot 38. Of Audubon and Bachman's type of *alpinus* (dry, stretched skin?); total length 342; tail vertebræ 133; hind foot 38. Measurements taken by collector from carcass of an adult male, No. 345, Coll. of

¹¹ Assuming the specimens recorded by Dr. Allen (l. c.) to be typical.

¹² For characters of *sabrinus* compare Bangs, Proc. Biol. Soc. Wash., 1896, p. 162.

¹³ The color characters of this diagnosis are based wholly on Richardson's description of the types in Fauna Boreali Americana. Audubon and Bachman's description and plate of *alpinus* appear to confirm these in every particular.

S. N. Rhoads, from Stuart Lake, B. C. ; total length 309 ; tail vertebræ 143 ; hind foot 40.

Average of seven adults of *sabrinus* (*vide* Bangs, l. c.) ; total length 278.6 ; tail vertebræ 130.4 ; hind foot 37.6. Skull measurements of the Stuart Lake specimen : occipito-nasal length 41.5 ; greatest breadth 25¹⁴ ; length of nasals 12.5 ; greatest length of mandible 23. Skull measurements of an adult male *sabrinus* from Maine : occipito-nasal length 38 ; greatest breadth 23 ; length of nasals 11 ; greatest length of mandible 22.

General remarks.—Making due allowance for the measurements given by Richardson, Audubon and Bachman of their types of *alpinus*, and comparing these with the accurate field measurements and complete skulls of the specimens of the *alpinus* group now available from numerous localities in the Rocky and Cascade Mountain regions, it seems just to consider all the mountain forms of *alpinus* as specifically distinct from *sabrinus* both in greater size and in the relative proportions of the skull and extremities. The lowland forms of *alpinus* closely agree in cranial characters with the type, but in their diminished size approach *sabrinus*.

A fine winter skin with skull and collector's measurements, from Camp Davidson, on the Yukon River, near the eastern boundary of Alaska, is larger than any other specimen of American *Sciuropterus* I have handled. Its measurements are given in the table. Its color is somewhat brighter and redder than any Cascade specimens of *fuliginosus* taken near the 49th parallel. Though not so dark as the Stuart Lake specimen, its characters point it out to be the large northern extreme in size of the *alpinus* group with color characters intermediate between *alpinus* and *fuliginosus*, as its faunal position would lead us to expect. The drab-gray shade of underparts, smoke-gray of sides of head and blackish-slate of eyelids and ears, ally it more closely to *fuliginosus*.

Specimens examined.—British Columbia, Fort Liard, 2 : Idaho, 3.¹⁵

¹⁴ This skull is relatively wider than the average of *alpinus* from other parts of British Columbia, in this respect not being so typical of the narrow cranial character of *alpinus* as contrasted with *sabrinus*.

¹⁵ While the foregoing was in type, two winter skins, with skulls and measurements, of the Rocky Mountain flying squirrel from Idaho County, Idaho, were forwarded to me by Mr. O. Bangs. They are of great interest, their cranial characters proving the specific difference between *alpinus* and *sabrinus* as already outlined, except that the typical *alpinus* form has relatively broader parietals than *fuliginosus*, *californicus* and *oregonensis*. In this respect the Idaho examples correspond to the Stuart Lake and Camp Davidson specimens and agree with these in the large size of skull, the flattened fronto-

2. *Sciuropterus alpinus fuliginosus* Subsp. nov. Cascade Mountain Flying Squirrel.

Type No. 1,058, ad. ♂, Col. of S. N. Rhoads. Collected by Allan Rupert on the Cascade Mountains near Martin Station, Kittitas Co., Washington, at an elevation of about 8,000 feet, March, 1893.

Geographic distribution.—Higher elevations of the Cascade, Coast and Sierra Nevada Mountains, probably intergrading southward into subspecies *californicus*, and in the coast lowlands to *oregonensis*.

Habitat.—Spruce forests of the higher mountains.

General characters.—Size and proportions as in *alpinus*; colors darker, more sooty, browner above, beneath brownish-yellow.

Color.—Winter and summer pelages very similar, not glossy. Color of type: hair of back, rump, upper sides, top of head and base of tail, minutely tipped with broccoli brown,¹⁶ the brown tips poorly concealing, even in the smoothest and fullest pelaged specimens, the blackish slate of under fur, giving the upper parts a dull mottled slaty-drab appearance. Upper basal half of tail like back, remainder becoming more slaty, the terminal third blackish-slate with a smoke gray cast. Upper surface of flying membrane like upper terminal third of tail. Upper surfaces of feet mouse-gray; the fur covering hind toes gray. Lower surface of tail smoke-gray, becoming more broadly bordered with blackish-slate toward distal end. Entire underparts light drab-gray, with a wood-brown tinge at base of throat and along lower margin of flying membrane; a nearly white narrow stripe extends along extreme outer lower margin of flying membrane in contrast with the dark colors of upper margin; basal $\frac{1}{3}$ of hairs of underparts plumbeous. Hairly soles of feet and

parietal plane and great relative mastoid width as contrasted with skulls of *sabrinus*. In color the oldest example, No. 6,959, Col. of E. A. and O. Bangs is darker, less rusty, wood-brown than Maine *sabrinus* above and the tail is more heavily shaded with black above and below. The sides of face, lips, eyelids and ears are strongly shaded with black on a smoke-gray ground and the underside of body tinged with wood brown, darkest on sides of abdomen. Upper feet, grayish plumbeous. Total length 304 mm. tail vertebrae 146; hind foot 40; ear from crown, 16. The other specimen No. 6,960 is darker (blackier) above, the brown having an olive cast. This form is lighter colored and smaller than *fuliginosus*, darker and smaller than *alpinus* and paler and larger than *sabrinus*. Its cranial characters, as above outlined, are quite distinct from those of *sabrinus* and agree with *alpinus* in their differences from *fuliginosus*. I propose to name it for Mr. Outram Bangs, *Sciuropterus alpinus bangsi*, subsp. nov. Type, No. 6,959, Col. of E. A. & O. Bangs, from Idaho County, Idaho. Col. by Harbison and Bargamin, Raymond, Idaho.

¹⁶ Color-standards of Ridgway's Nomenclature are used in this paper.

outer surfaces of ears drab-gray; sides of head smoke-gray. A narrow circle of blackish slate surrounds the eyes; whiskers black.

Cranial characters.—Presumably as in *alpinus*. Compared with *sabrinus* from Maine the skull is much larger, more elongate and depressed. The greatest width of parietals is less than their greatest (lateral) length, whereas in *sabrinus* these proportions are reversed. In adult *fuliginosus* the widths of frontal constriction before and behind the postorbital processes are about equal; in *sabrinus* the posterior width greatly exceeds the anterior interorbital constriction. Owing to the interorbital depression of frontals and their postorbital inflation, together with the pug-nosed shape of the nasals in *sabrinus*, the lateral facial profile of that species is decidedly dished. In *fuliginosus* the facial profile is straight, or in some cases slightly convex. The incisors in *sabrinus* are deep chrome, in *fuliginosus* and its western allies they are orange-rufous.

Dimensions (of type taken in flesh).—Total length 317 millimeters; tail vertebræ 153; hind foot 40; ear, from crown (relaxed) 18; length of carpal fascia 25. Average of 3 adults from type locality (in above order): 310; 146; 41.5; 17; 26. Skull of type: occipito-nasal length 40; greatest breadth 23.8; length of nasals 13; frontal constriction behind postorbital processes 9; interorbital constriction 8.2; greatest length of mandible 23.2. Average of 3 adults from type locality (in above order): 41; 24; 12.8; 8.5; 8; 24.2.

General remarks.—Subspecies *fuliginosus*, from its close resemblance to all the characters justly assigned to *alpinus* by Richardson and Bachman, is nothing more than a dark race of the Rocky Mountain animal and equal to if not exceeding it in size. The Stuart Lake specimen, already referred to under *alpinus*, closely resembles *fuliginosus*, differing only in slightly smaller size, browner back and blacker face in the direction of *oregonensis*, confirming the supposition of a complete intergradation between the two at intermediate elevations. From what we know of the fauna and flora of the Selkirk Range, it is probable that the Flying Squirrel of those mountains is nearer *fuliginosus* than *alpinus*. The form living in the lowlands of the upper Great Basin, the existence of which near Vernon, B. C., I once had great reason to remember, but which an unfortunate encounter with hornets prevented me from obtaining, would be of great interest. It is, so far as I can remember from a hasty but vivid view in life, a distinctly smaller, lighter colored animal than *fuliginosus*.

Specimens examined.—Alaska, 1; British Columbia, 8; Washington, 4.

3. *Sciuropterus alpinus californicus* subsp. nov. Sierra Madre Flying Squirrel.

Type No. 3,487, ad. ♀, Col. of S. N. Rhoads. Collected by R. B. Herron on the San Bernardino Mountains (near Squirrel Inn), San Bernardino County, California, at an elevation of 5,200 feet, June 5, 1896.

Geographic distribution.—Sierra Madre Mountains, California.

Habitat.—Mixed pine and oak belt of the mountains, living in deserted woodpecker burrows in dead pine stubs 10 to 30 feet from the ground.

General characters.—Proportions much as in *alpinus*, but somewhat smaller and with a relatively shorter hind foot and tail. Color palest (?) of the American flying squirrels.

Color (of type).—Above, including whole upper surface, except nose, forehead, flying membrane, fore and hind legs and terminal $\frac{2}{3}$ of tail, between drab-gray and wood-brown; bases of upper body hairs slate color, this shade predominating on upper surfaces of flying membrane and the fore and hind legs. Hind and fore feet brownish smoke-gray, fading on the toes to whitish smoke-gray. Upper basal third of tail like back, remainder of tail becoming dark smoke-gray. Sides of face and neck and across rostrum pale ashen smoke-gray. Black whiskers fading to smoke-gray along the terminal half. Ears drab-gray within and without. Mouse-gray orbital ring scarcely appreciable. Whole underside of body, head and limbs nearly uniform pale, buffy or yellowish-gray, with a French gray cast caused by the darkening of the exposed basal portions of the hairs and becoming nearly pure white on throat, lower fore legs and inner margins of thighs. Furred soles of hind feet and whole underside of tail pale drab.¹⁷

Cranial characters.—Smaller, but otherwise similar to those of *fuliginosus*. The incisors are but slightly darker than those of *sabrinus*.

Dimensions (of type taken in the flesh).—Total length, 286 millimeters; tail vertebrae, 127; hind foot, 38; ear, from crown (when dry), 16; length of carpal fascia, 24. Average of four suckling adult female topotypes (in above order): 292, 133, 38,—, 23. Skull, of type: occipito-nasal length, 39; greatest breadth, 23.8;

¹⁷ This color name is not used by Ridgway; in fact, nearly all the colors of this subspecies are not to be matched in the Nomenclature of Colors.

length of nasals, 11.5; frontal constriction behind postorbital processes, 8.4; interorbital constriction, 8.3; greatest length of mandible, 21.8.

General remarks.—The San Bernardino or Sierra Madre flying squirrel, true to its environment, has assumed the characteristic paleness of the Southern California mountain mammalia as contrasted with their near allies of the Cascade Range. In size and general proportions it seems to be intermediate between *fuliginosus* and *oregonensis*; in color it probably comes closest to *alpinus*, but is much grayer. Its skull is almost as small as in *oregonensis*, and the characteristic relative narrowness of the posterior frontal constriction distinguishing the *alpinus* group from *sabrinus* is very pronounced.

Mr. Herron makes the following interesting notes on this subspecies: "Those four flying squirrels are the only ones I have taken in this country. They were all taken from dead pine trees or stumps, in holes made by the red-shafted flicker, from 10 to 30 feet from the ground. * * * * Unlike the eastern species, I do not believe they have their young in nests made of leaves placed in the branches of trees, as I have never seen nests of this kind in the mountains, but I think they have their young in these deserted woodpeckers' nests. Their food, I think, is mostly acorns. They were all taken at an altitude of about 5,200 feet, near Squirrel Inn. I would say they range from four to six thousand feet altitude, as they have never been seen in Bear Valley some 30 miles farther east on the same range, and about 8,000 feet altitude."

Specimens examined.—California, San Bernardino Mountains, 4.

4. *Sciuropterus alpinus oregonensis* (Bachman). Bachman's Flying Squirrel.¹⁸

1839. *Pteromys oregonensis* Bachman, Jour. Acad. Nat. Sci., Phila., VIII, p. 101.

1877. *Sciuropterus volucella* var. *hudsonius* Allen, Monog N. Amer. Rod., p. 655.

1881. *Sciuropterus volucella* b. *oregonensis* [sic] Trouessart, Cat. des Mam., p. 67.

Type locality.—"Pine woods of the Columbia [River] near the sea." Probably near St. Helen, Columbia Co., Oregon.¹⁹

¹⁸ This name is more distinctive than "Oregon" or "Pacific Coast" Flying Squirrel, as the mountains of both these regions are inhabited by *fuliginosus*, and it is probable that the lowland coast form of northern California is a distinct race.

¹⁹ In "Townsend's Narrative," page 177, it is stated that he secured "several new species of birds and two or three undescribed quadrupeds" during his residence with Nuttall on a brig moored "near the lower mouth of the Wal-lammet." This was during the early part of November, 1834.

Geographic distribution.—Lower elevations of the Pacific Slope, from southern Alaska to northern California, intergrading at higher elevations with *fuliginosus* and southwardly toward a lighter colored race more closely allied to *californicus*.

Habitat.—Coniferous and deciduous forests.

General characters.—Size intermediate between *alpinus* and *volans*; tail long and slender; colors darkest of the American flying squirrels.

Color (winter pelage).—Above, including body, crown of head, hips and shoulders Mars-brown with a russet shade and tinged with clay color, the whole being darkened by numerous black-tipped hairs. Upper surfaces of feet, hams, shoulders, flying membrane, ears and tail more or less shaded with seal-brown to slate-black; in darkest individuals from Sumas, B. C., these parts are dark clove-brown to black. In the type the black has faded to dark Isabella color, and the brown to light russet, the darker terminal part of the tail being slaty russet. In British Columbia and Alaska specimens of *oregonensis* the upper tail and feet are in marked contrast with the colors of the back and rump, becoming slaty at the base of the tail, and in darkest specimens this becomes dull black over the terminal third of the tail, the hairs of the upper base of the tail being more or less mixed with dark wood-brown or broccoli-brown. In the type the contrast between tail and body colors is less marked. Another color peculiarity of *oregonensis* is the slight difference in shade of upper and lower caudal pelages and the contrast between the lower tail and lower body colors. In all the other American forms the tail colors agree closely with those of the corresponding surface of body.

Lower surface of body, from base of neck to vent, Isabella-color, tinged with rusty on thighs, breast and flying membrane, and more or less darkened by the exposed slate-gray bases of hairs, this color reaching more than half way to the hair tips. Lower surface of fore legs, a spot on chin and a narrow median area from breast to vent, whitish. Region around mouth and eyes and nasal pad blackish. Sides of face and across rostrum light slate-gray.

Dimensions (of type, *vide* Bachman, taken from skin).—Total length, 302 millimeters; tail vertebræ, 132; hind foot, 39; ear, from crown, 15; carpal fascia, 23.5. Average dimensions of four adults, two from Oregon, two from Sumas, B. C., in above order: 288, 135, 39, 17, 23. Skull: average of three adults—total length, 39;

MEASUREMENTS OF NINETEEN SPECIMENS OF THE *SCIUROPTERUS ALPINUS* GROUP OF WESTERN NORTH AMERICA.

Catalogue No.	Collection.	Sex.	Name.	Locality.	Total length.	Tail vertebre.	Hind foot.	Ear, from crown.	Carpal fascia.	Remarks.
	Brit. Museum ?		<i>S. alpinus</i> (Rich.)	Rocky Mts., N. W. Alberta, "Elk Riv." ?	"336"	"134"	"38"	"12.8"		Richardson's type.
1,058	Acad. N. Sci. ?		<i>S. alpinus</i> (Aud. & Bachm.).	Rocky Mts., S. E. Idaho. ?	"342"	"127"	"38"	"9.7"		Aud. & Bach. type.
1,059	S. N. Rhoads.	♂	<i>S. alpinus fuliginosus</i> Rhoads.	Cascade Mts., Martin, Kittitas Co., Wash.	317	153	40	18	25	Type.
1,060	S. N. Rhoads.	♂	<i>S. alpinus fuliginosus</i> Rhoads.	Cascade Mts., Martin, Kittitas Co., Wash.	304	140	42	17	25	Topotype.
345	S. N. Rhoads.	♀	<i>S. alpinus fuliginosus</i> Rhoads.	Cascade Mts., Martin, Kittitas Co., Wash.	304	140	42	17	28	Topotype.
19,909		♂	<i>S. alpinus fuliginosus</i> Rhoads.	B. Columbia, Stuart Lake.	309	143	40		26	
35,320	Sm. Inst.	♀	<i>S. alpinus fuliginosus</i> Rhoads.	E. Alaska, Camp Davidson, Yukon River.	335	150	42.5		25	
3,485	S. N. Rhoads.	♀	<i>S. alpinus californicus</i> Rhoads.	Calif., San Bernardino Mts. "Sq. Inn." S. B. Co.	298	140	38		20	Topotype.
3,486	S. N. Rhoads.	♀	<i>S. alpinus californicus</i> Rhoads.	Calif., San Bernardino Mts. "Sq. Inn." S. B. Co.	280	127	37		24	Topotype.
3,487	S. N. Rhoads.	♀	<i>S. alpinus californicus</i> Rhoads.	Calif., San Bernardino Mts. "Sq. Inn." S. B. Co.	286	127	38		24	Type.
3,488	S. N. Rhoads.	♂	<i>S. alpinus californicus</i> Rhoads.	Calif., San Bernardino Mts. "Sq. Inn." S. B. Co.	305	149	38		25	Topotype.
253	Acad. N. Sci.	♂	<i>S. alpinus oregonensis</i> (Bachm.).	"Oregon," Mouth of Columbia River.	"302"	"132"	"39"	"15"	"23.5"	Type.
14,987	Sm. Inst.	♂	<i>S. alpinus oregonensis</i> (Bachm.).	Oregon, "Clackamas."	263	114	39	17	23	Alcoholic.
11,211	A. M. N. H.	♂	<i>S. alpinus oregonensis</i> (Bachm.).	Oregon, Fort Klamath.	275	127	39	17	23	Alcoholic.
11,212	Sm. Inst.	♀	<i>S. alpinus oregonensis</i> (Bachm.).	Washington, Puget Sound.	316	135	40.5	16.5	24	Alcoholic.
3,600	E. A. & O. Bangs.	♀	<i>S. alpinus oregonensis</i> (Bachm.).	Washington, Puget Sound.	314	137	40	17	23	Alcoholic.
3,643	E. A. & O. Bangs.	♀	<i>S. alpinus oregonensis</i> (Bachm.).	B. Columbia, Sumas.	315	140	40		23	
5,550	E. A. & O. Bangs.	♀	<i>S. alpinus oregonensis</i> (Bachm.).	B. Columbia, Sumas.	300	140	39		23	
			<i>S. alpinus oregonensis</i> (Bachm.).	B. Columbia, Slave Lake, Coast Range.	283	140	40		22	

*Those listed under *oregonensis*, marked with an asterisk, are more or less intermediate between that race and *fuliginosus* in size. The alcoholic specimens taken by Kennerly at Puget Sound may have come from a considerable elevation. They agree more nearly in size with *fuliginosus*, with which form they perhaps belong in the table. The Sumas specimens are typical *oregonensis* in color.

greatest breadth, 23.8; length of nasals, 11.8; greatest length of mandible, 22; frontal constriction behind post-orbital processes, 8.5; interorbital constriction, 7.5.

General remarks.—A study of *oregonensis*, as represented by a fair series of specimens extending from Tongas, Alaska, to northern California, seems to indicate that three forms of this small, dark colored type inhabit the Pacific Coast lands, the typical form found from northern Oregon to southern Alaska being darkest and brownest, becoming larger and more rusty northward, and smaller, grayer and more tawny southward. Lack of specimens from the two extremes of its distribution compel me to reserve a decision on these points. In some respects the differences between *oregonensis* and the other subspecies of *alpinus* recognized in this paper seem almost specific, but in some of the specimens from intervening localities I find such a strong indication of intergrading with *fuliginosus* that this separation seems unwarranted.

Specimens examined.—Alaska, 2; British Columbia, 5; Washington, 4; Oregon 5; ? California, 1.